

What is claimed is:

- [1) A solid diamond electron emitter comprising a diamond greater than 5μ in thickness having a pointed surface with a radius of less than about 100μ .
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- 2) The solid diamond electron emitter of claim 1 wherein said radius is less than about 10μ .
- 10 3) The solid diamond electron emitter of claim 2 wherein said radius ranges from about 3 angstroms to about 3μ .
- 4) The solid diamond electron emitter of claim 2 wherein said point has a surface roughness of between about 20 angstroms and about
15 10μ .]
- 5) The solid diamond electron emitter of claim [5] 18 wherein said point has a surface roughness below about 10 angstroms.
- 20 [6) The solid diamond electron emitter of claim 1 wherein said point is produced using a non-contact machining technique.



7) The solid diamond electron emitter of claim 6 wherein said non-contact machining technique is selected from the group consisting of electron beam, ion beam and laser machining techniques.]

5 8) The solid diamond electron emitter of claim [5] 18 wherein said radius is less than about $10[\mu]$ um.

9) The solid diamond electron emitter of claim [5] 18 wherein said radius ranges form about 3 angstroms to about $3[\mu]$ um.

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10) The solid diamond electron emitter of claim [1] 18 further including a conductive shank to which said diamond is adhered.

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11) The solid diamond electron emitter of claim 10 wherein said diamond is adhered to said conductive shank by a vapor deposited layer of palladium or titanium.

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12) The solid diamond field emitter of claim 10 wherein said radius is less than about $10[\mu]$ um.

13) The solid diamond electron emitter of claim 10 wherein said radius ranges from about 3 angstroms to about $3[\mu]$ um.



14) The solid diamond electron field emitter of claim 10 wherein said point is produced using a non-contact machining technique.

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15) The solid diamond electron emitter of claim 14 wherein said non-contact machining technique is selected from the group consisting of electron beam, ion beam and laser machining techniques.

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[16) A field emitter extractor gauge comprising a field emitter array, an anode grid, a focus plate, a reflector and a collector wherein said field emitter array comprises an array of solid diamond electron emitters each comprising a diamond greater than 5μ in thickness having a pointed surface with a radius of less than about 100μ .

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17) A residual gas analyzer comprising a field emitter array, an anode grid, a focus plate and a quadrupole wherein said field emitter array comprises an array of solid diamond electron emitters each comprising a diamond greater than 5μ in thickness having a pointed surface with a radius of less than about 100μ .]

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18) A solid diamond electron emitter comprising a diamond greater than 5 μ m in thickness having a pointed surface with a radius of less than about 100 μ m, said pointed surface having a roughness of between about 20 angstroms and about 10 μ m.

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19) A field emitter extractor gauge comprising a field emitter array, an anode grid, a focus plate, a reflector and a collector wherein said field emitter array comprises an array of solid diamond electron emitters each comprising a diamond greater than 5 μ m in thickness having a pointed surface with a radius of less than about 100 μ m, said pointed surface having a roughness of between about 20 angstroms and about 10 μ m.

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